

What is claimed is:

1. A method of making a non-Lambertian diffuser, the method comprising the steps of:

providing a substrate body having at least a first side;

selecting a buffing agent having a desired grit; and

5 buffing the first side of the substrate body with the buffing agent to form a plurality of irregularities in the first side according to the grit of the buffing agent to thereby form a diffuser surface having light propagating characteristics defined by the orientation, contour and depth of the plurality of irregularities.

2. The method according to claim 1, wherein the step of providing further includes providing a substrate body from a plastic material selected from one of the group consisting of at least polycarbonate, polyester, acrylic, nylon, polystyrene, tetrafluoroethylene, polyimide, polyvinyl chloride, polymethyl methacrylate, TPX™, and ARTON™.

3. The method according to claim 1, further comprising the step of:

placing the buffing agent directly on the first side of the substrate body prior to the step of buffing.

4. The method according to claim 1, further comprising the steps of:  
 placing the buffing agent on a buffing apparatus;  
 moving the buffing apparatus into contact with the first side of the substrate body; and  
 5 buffing the first side with the buffing apparatus.
  
5. The method according to claim 1, wherein the step of selecting further includes selecting a buffing agent from at least one of the group consisting of aluminum oxide, silicon carbide, and cerium oxide.
  
6. A method of making a non-Lambertian diffuser, the method comprising the steps of:  
 providing a substrate body having at least a first side;  
 selecting an etching agent;  
 5 placing the etching agent on the first side of the substrate body for an etching time duration; and  
 etching a plurality of irregularities into the first side, the plurality of irregularities having at least a size, a depth and a contour formed according to a reaction between the substrate body and the etching agent and according to the etching  
 10 time duration to thereby form a diffuser surface on the first side having light propagation characteristics defined by the size, depth and contour of the irregularities.

7. The method according to claim 6, wherein the step of providing further includes providing a substrate body formed from a glass material.
8. The method according to claim 6, wherein the step of providing further includes providing a substrate body formed from a glass material selected from at least one of the group consisting of light barium crown, phosphate crown, crown, flint, extralight flint, light flint, fused silica, and borosilicate.
9. The method according to claim 6, wherein the step of selecting further includes selecting an etching agent from at least one of the group consisting of sodium hydroxide, potassium hydroxide, hydrofluoric acid, and ammonium fluoride.
10. The method according to claim 6, further comprising the steps of:
  - mixing a plurality of solid particles with the acid agent to form a working compound, each of the plurality of particles having a size, a shape and a mass; and
  - etching the plurality of irregularities into the first side, the size, depth and contour of the plurality of irregularities determined by the size, shape and mass of the plurality of particles as well as the reaction between the etching agent and the substrate body and the etching time duration.

11. The method according to claim 10, further comprising the step of:  
 applying pressure against the first side after the step of placing the working compound thereon in order to increase the depth of the plurality of irregularities.
12. The method according to claim 10, wherein the step of mixing further includes providing a plurality of particles each having a general shape selected from the group consisting of hexagonal, rhombohedral, and spherical, and a diameter within a range of diameters from about 4 mm to about 0.045 mm.
13. The method according to claim 11, wherein the plurality of particles are provided having a number of different diameters, the diameter of each of the plurality of particles being within the range of diameters.
14. The method according to claim 10, wherein the step of mixing further includes providing the plurality of particles selected from at least one of the group consisting of silicon carbide and boron carbide.
15. The method according to claim 6, further comprising the steps of:  
 selecting a mask having a plurality of openings passing through the mask, each of the plurality of openings having a length, a width, an orientation and a shape;  
 securing the mask flush against the first side of the substrate body;  
 placing the etching agent over the mask on the first side; and

etching the plurality of irregularities into the first side of the substrate body whereby the size, depth and contour of the plurality of irregularities are determined by the length, width, orientation and shape of the plurality of openings in the mask as well as the reaction between the etching agent and the substrate body and the etching  
 10 time duration.

16. The method according to claim 15, wherein the step of selecting a mask further includes selecting a mask made from a material selected from the group consisting of polyester and polycarbonate.

17. A method of making a non-Lambertian diffuser, the method comprising the steps of:

providing a substrate body having at least a first side;

5 selecting a blasting agent including a plurality of shot particles each having a size, a shape and a mass; and

forcing the blasting agent against the first side of the substrate body at a predetermined velocity to form a plurality of irregularities in the first side according to the size, shape and mass of the plurality of shot particles and the predetermined velocity to thereby form a diffuser surface structure in the first side according to a  
 10 depth, contour and size of the plurality of irregularities.

18. The method according to claim 17, wherein the step of providing further includes providing a substrate body formed from a glass material.

19. The method according to claim 17, wherein the step of providing further includes providing a substrate body formed from a glass material selected from at least one of the group consisting of light barium crown, phosphate crown, crown, flint, extralight flint, light flint, fused silica, and borosilicate.

20. The method according to claim 17, wherein the step of providing further includes providing a substrate body formed from a metal material.

21. The method according to claim 17, wherein the step of selecting further includes selecting the plurality of shot particles each having a diameter within a range from about 4 mm to about 0.045 mm and a general shape selected from the group consisting of hexagonal, rhombohedral, and spherical.

22. The method according to claim 17, wherein the step of selecting further includes selecting the plurality of shot particles from shot particles made from a metal material.

23. A non-Lambertian diffuser comprising:  
a substrate body having at least a first side; and

a diffuser surface relief structure formed non-holographically in the first side, the surface relief structure defining a plurality of irregularities in the first side and having  
 5 light propagating characteristics defined by at least one of the size, depth, length, width, orientation, and contour of the plurality of irregularities.

24. The diffuser according to claim 23, wherein the substrate body is a glass material substrate.

25. The diffuser according to claim 23, wherein the substrate body is a plastic material substrate.

26. The diffuser according to claim 23, wherein the substrate body is a metallic material substrate.

27. The diffuser according to claim 23, wherein the surface relief structure comprises a plurality of scratches in the first side formed by buffing the first side with a buffing agent having a predetermined grit, each of the plurality of scratches having a depth, a contour, a length, a width, and a shape.

28. The diffuser according to claim 23, wherein the surface relief structure comprises a plurality of closely spaced depressions in the first side each having a depth and a contour and each formed by forcing a plurality of shot particles at a

predetermined velocity against the first side, the shot particles each having a  
 5 predetermined size, shape and mass.

29. The diffuser according to claim 23, wherein the surface relief structure is etched into the first side by an etching agent carrying a plurality of particles each having a size, shape and mass.

30. The diffuser according to claim 29, wherein the surface relief structure is further etched into the first side by pressing the plurality of particles into the first side.

31. The diffuser according to claim 23, wherein the surface relief structure is further etched into the first side by an etching agent contacting the first side through a plurality of openings in a mask, the plurality of openings each having a length, a width, an orientation and a shape.